OGGETTO SOTTOPOSTO A PROVE / *ITEM UNDER TEST*	
Descrizione *Description*	Display used for information system
Modello base *Basic Model type*	Compact TFT 32" Outdoor Code 993201900100
Modelli derivati *Derived Model type*	D_CPTOU3210-LS-P1L3ARIE-H- - 4G1-TTSPFA-Z0 D_CPTOU3210-LS-P1L3ARIE-H- - 4G1-TTSPFA-Z1
Identificativo interno *Storage No.*	190883 (sampled by customer)
Richiedente *Applicant*	Aesys S.p.A.
Indirizzo *Address*	Via Pastrengo, 7/C I-24068 Seriate (BG) - Italia
Prove effettuate presso *Test carried out by*	TÜV Rheinland Italia Srl Via E. Mattei, 3 – 20010 Pogliano Milanese (Italy)
Norme di riferimento *Reference Standards*	**EN 50121-1:2015; EN 50121-4:2016; EN 55024:2010; EN 55032:2015; EN 61000-6-4:2007+A1:2011; EN 61000-3-2:2014; EN 61000-3-3:2013; ETSI EN 301 489-1 V2.1.1; ETSI EN 301 489-3 V2.1.1; ETSI EN 301 489-52 V1.1.0; ETSI 303 446-2 V1.1.0;**
Scopo delle prove *Scope of the tests*	To verify the compliance with the following clauses of reference standards - See summary of testing at *TEST SUMMARY* section
Risultati di prova *Test Results*	**COMPLIANT**

Data ricevimento campioni *Date of samples receiving*	30/09/2019		
Data inizio prove *Date of tests start*	01/10/2019	**Data fine prove** *Date of tests end*	23/10/2019
Rapporto composto da *Test report composed by*	60 Pages		

Provato da / Tested by *(name + signature)*		**Approvato da / Approved by** *(name + signature)*
 Andrea Bortolotti *(Laboratory Technician)*		 Roberto Radice (*Reviewer*)

The results referred in this report are only relevant to the samples tested and described in this report.
Only complete reproduction of this test report is permitted without written authorisation of TÜV Rheinland Italia

RELEASE CONTROL RECORD		
TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
28118771-003	Original release	06/12/2019

OGGETTO SOTTOPOSTO A PROVE / *ITEM UNDER TEST*	
Descrizione *Description*	Display used for information system
Marca *Brand*	aesys
Costruttore *Manufacturer*	Aesys S.p.A.
Modello base *Basic Model / Type reference*	Compact TFT 32" Outdoor Code 993201900100
Dati di targa *Ratings*	
Classificazione *EUT classification*	---
Massima frequenza di clock *Maximum clock frequency*	---
Installazione *Standing*	Wall / Ceiling / Embedded / Pole support

Product Description

This display can be part, with any other panels similar or of different types, of a system aimed at informing users in transit on rail vehicles of information to travelers on the railway lines, or general information.

Mechanical			
Size:	TFT 32"		
Dimensions:	836 (L) x 530 (H) x 160 (D) mm		
Estimated Weight	45Kg		
Finish Front :	Aluminum, RAL Range, 50% GLOSS, not reflecting MAT, powder coating		
Finish Rear :	Aluminum, RAL Range, 50% GLOSS, not reflecting MAT, powder coating		
Protection grade:	IP55		
Front protection:	Antireflective (both side) Laminated Tempered glass with UV and IR protection (compliance to IK08 5J according to the EN62262)		
Lock system:	Hinged door, polyurethane bi-component vulcanized gasket; Special anti-vandal locks		
Interfaces:	1x Power Supply 1x RJ45 Data Line 1x M6 Additional ground interface 3x SMA connector (for Wireless 2G/3G/4G version, RF antenna & WLfi) 1x Audio Output (for further details see the attached mechanical drawing)		
Fixing points:	Monitor : Vesa standard 200x200mm, 4xM8 Female closed holes (for further details see the attached mechanical drawing)	Monitor : Vesa standard 400x400mm, 4xM8 Female closed holes (for further details see the attached mechanical drawing)	Monitor : Vesa standard 400x400mm, 4xM8 Female closed holes (for further details see the attached mechanical drawing)
Other:	Mechanical housing compliant to IK10 20J according to the EN62262		

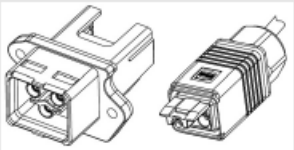
Electrical	
Size	TFT 32"
Input power supply voltage:	Nominal 220-240VAC Range: 198VAC ÷ 264VAC
Input power supply frequency range:	50/60Hz
Protections:	Overload, overvoltage, over temperature
Power Consumption:	Typ.: 130W (@Brightness 70%) Max.: 165W (@ Brightness 100%) Max.: 325W (@ Brightness 100%, Heating ON)

Environmental	
Operating temperature:	-25° ÷ 50° C when installed with Suncover / Sunshade
Thermal management:	At high temperature: - Automatic TFT-LCD matrix brightness linear derating down to maximum 50% with the increase of the environmental temperature - TFT-LCD matrix and PC switched OFF when the highest temperature limit is reached At low temperature: - display is switched off when the lowest temperature limit is reached
Operating humidity:	10 % ÷ 95 % R.H. without condensation
Storage temperature:	-20° ÷ 60° Celsius – Ambient temperature 10% ÷ 95% - R.H. at this conditions: - till +40°C @90% R.H. - till +50°C @60% R.H. - till +60°C @40% R.H.
Cooling system:	Direct air exchange with the outside by special filter
Heating system:	Installed
Temperature Sensor	Installed
Light Sensor	Installed
Acceleration Sensor	*Upon request*

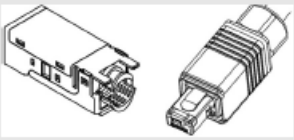
Data Communication	
Type of communication:	Copper LAN Ethernet 10/100/1000 Base TX
Protocol type:	Different protocol types supported (according to the software player hosted), SNMP protocol for diagnostic data
Other:	*Upon request:* *- Built-in LAN Ethernet 10/100/1000Base TX to 10/100/1000Base FX Media converter (multimode)* *- Wireless 2G/3G/4G* *- Wi-fi* *(for further details refer to the commercial offer)*
Connectors	
Power supply:	1x Harting PushPull Power 2/0, panel feed-through and connector, 3-poles (2+PE)
Data line:	1x Harting PushPull RJ45 Technology, RJ45-panel jack feed-through
Audio output:	1x Cable Gland
Antenna:	3x SMA Connector
Ground interface:	1x M6 male ground point

Optical specifications (matrix module)	
Size:	TFT 32"
Format:	16:9
Type:	Normally black
(*) Active area:	698.4 (H) x 392.85 (V) mm
(*) Pixel pitch:	0.36375 x 0.36375 mm x RGB
Pixel format:	1920 (H) x 1080 (V) (Native resolution)
Colour depth:	16.7M colors
Luminance: (on white colour)	1.000 cd/m^2 (typ.) @ Center point
Contrast ratio:	4000 : 1 typ. (with dimming)
Viewing angle (CR > 10):	R/L 178° (typ.) – U/D 178° (typ.)
Response time:	8ms (Typ., Grey-to-Grey)
Backlight Technology:	LED

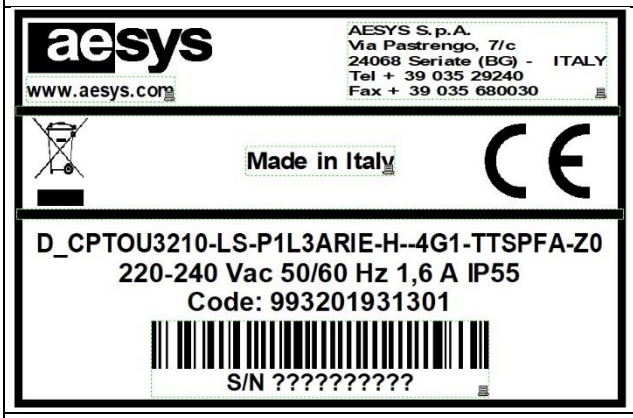
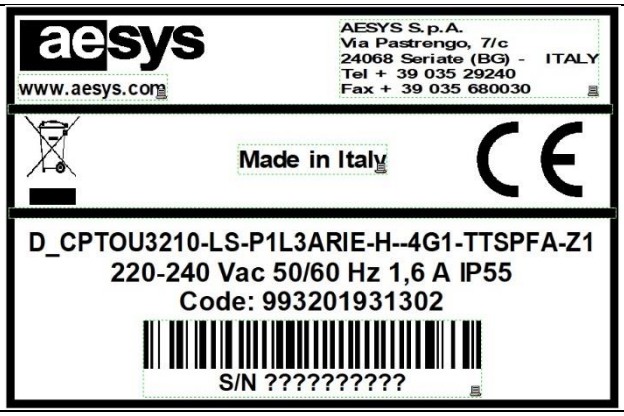
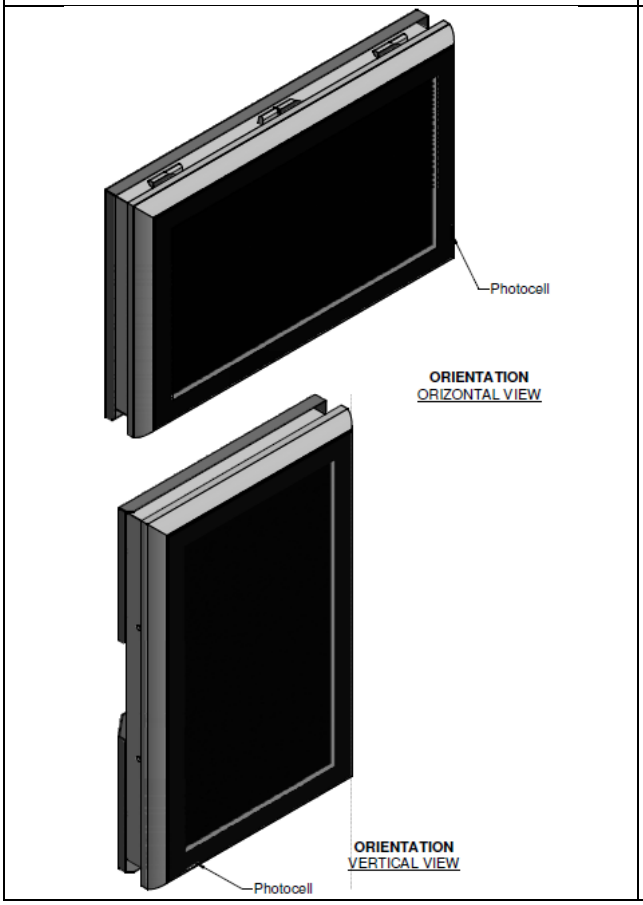
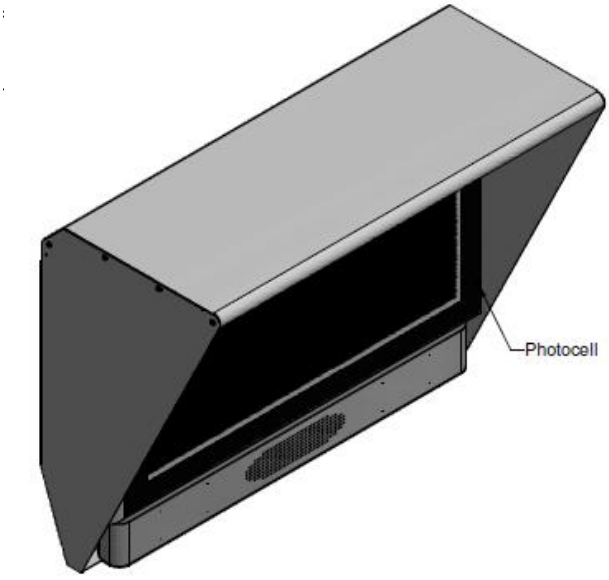
Power Supply

Connector Type	Pin #	Signal	Description
 Harting Push pull V4 Power plug	1	L	Line 230Vac power input
	2	N	Neutral 230Vac power input
	3	GND	Ground

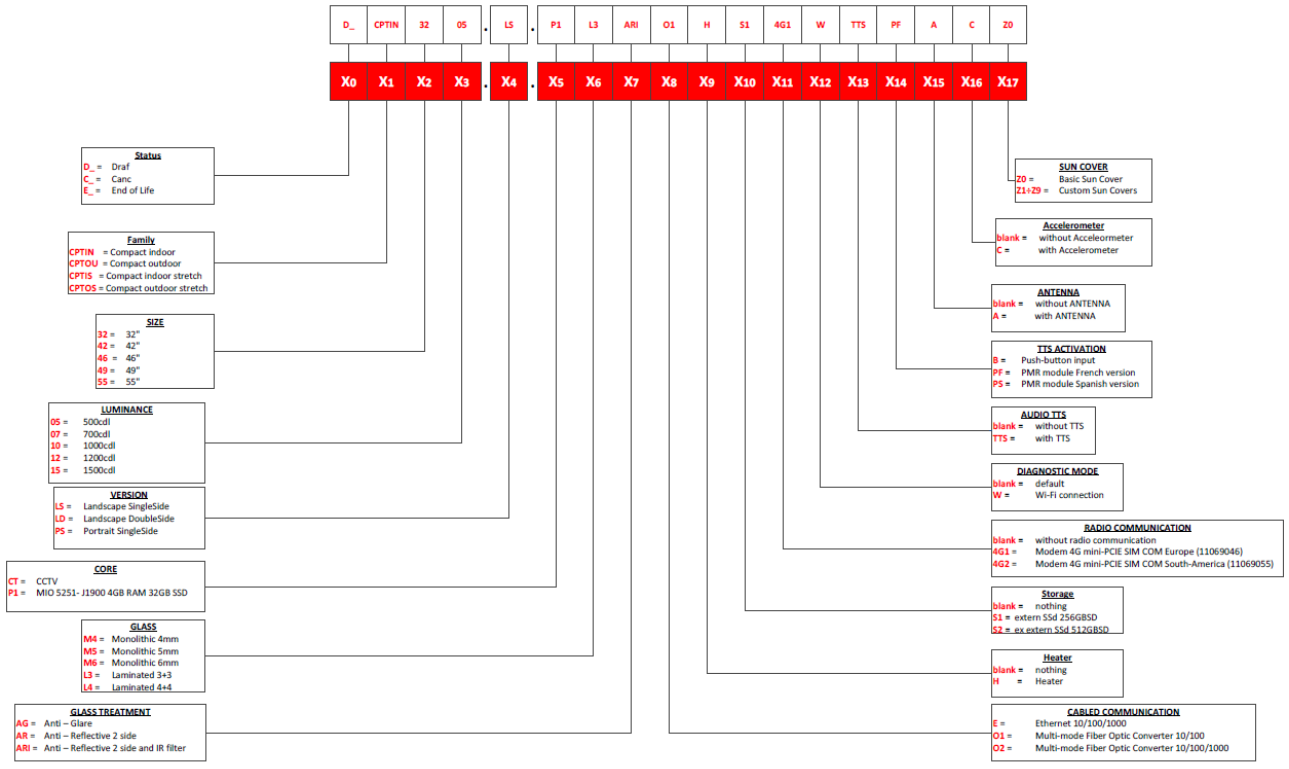
Ethernet data line

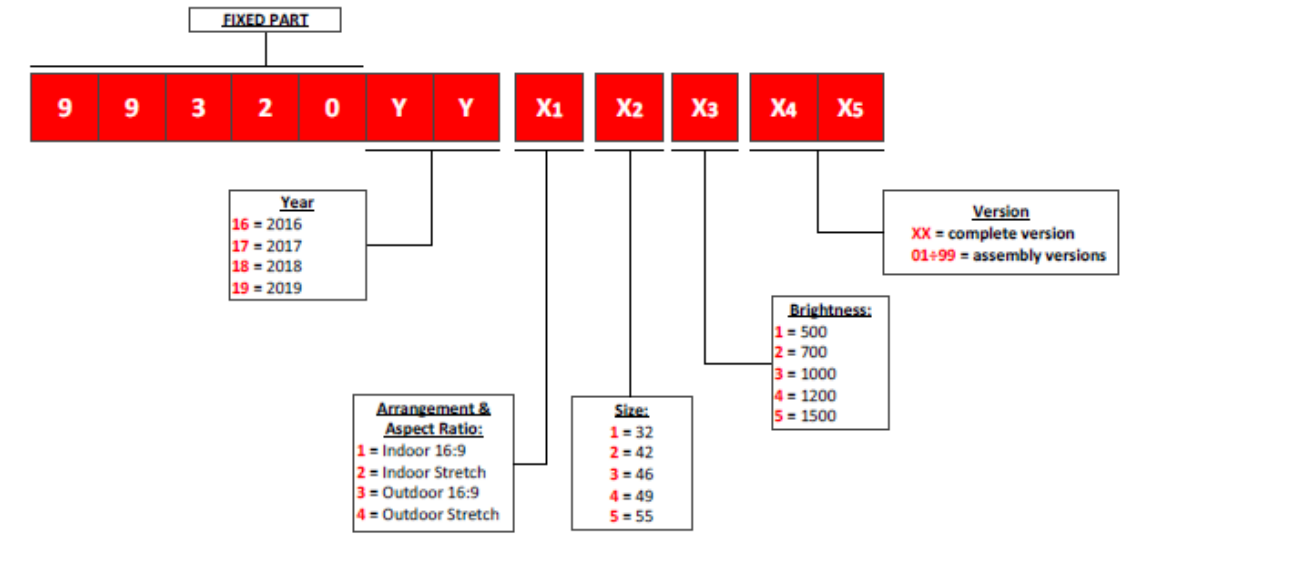
Connector Type	Pin #	Signal	Description
 Harting Push pull V4 RJ45	1	TX+	Transmit Data +
	2	TX-	Transmit Data -
	3	RX+	Receive Data +
	4	BI_DC+ (GHz)	DC+ for GBe
	5	BI_DC- (GHz)	DC- for GBe
	6	RX-	Receive Data -
	7	BI_DD+ (GHz)	DD+ for GBe
	8	BI_DD- (GHz)	DD- for GBe

Derived model(s)

D_CPTOU3210-LS-P1L3ARIE-H- - 4G1-TTSPFA-Z0	D_CPTOU3210-LS-P1L3ARIE-H- - 4G1-TTSPFA-Z1
	
Commercial name	Sun cover
	

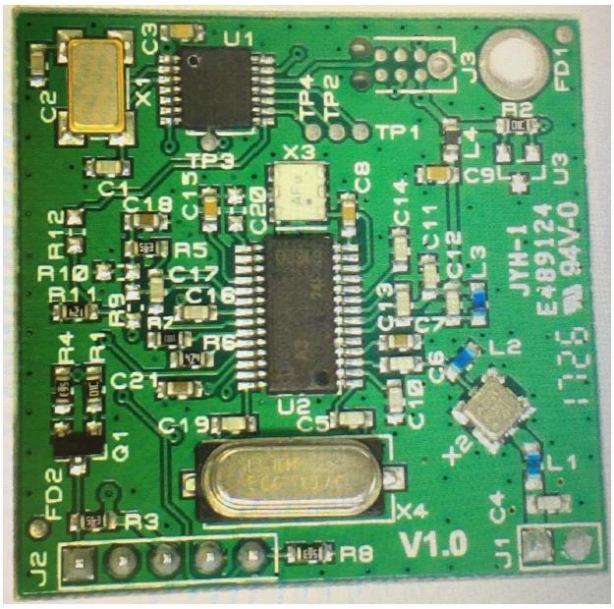
Speaking code


D_ CPTIN 32 05 . LS . P1 L3 ARI O1 H S1 4G1 W TTS PF A C Z0
X0 X1 X2 X3 . X4 . X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15 X16 X17
Status
D_ = Draf
C_ = Canc
E_ = End of Life
Family
CPTIN = Compact indoor
CPTOU = Compact outdoor
CPTIS = Compact indoor stretch
CPTOS = Compact outdoor stretch
SIZE
32 = 32"
42 = 42"
46 = 46"
49 = 49"
55 = 55"
LUMINANCE
05 = 500cdl
07 = 700cdl
10 = 1000cdl
12 = 1200cdl
15 = 1500cdl
VERSION
LS = Landscape SingleSide
LD = Landscape DoubleSide
PS = Portrait SingleSide
CORE
CT = CCTV
P1 = MIO 5251- J1900 4GB RAM 32GB SSD
GLASS
M4 = Monolithic 4mm
M5 = Monolithic 5mm
M6 = Monolithic 6mm
L3 = Laminated 3+3
L4 = Laminated 4+4
GLASS TREATMENT
AG = Anti – Glare
AR = Anti – Reflective 2 side
ARI = Anti – Reflective 2 side and IR filter
SUN COVER
Z0 = Basic Sun Cover
Z1÷Z9 = Custom Sun Covers
Accelerometer
blank = without Acceleormeter
C = with Accelerometer
ANTENNA
blank = without ANTENNA
A = with ANTENNA
TTS ACTIVATION
B = Push-button input
PF = PMR module French version
PS = PMR module Spanish version
AUDIO TTS
blank = without TTS
TTS = with TTS
DIAGNOSTIC MODE
blank = default
W = Wi-Fi connection
RADIO COMMUNICATION
blank = without radio communication
4G1 = Modem 4G mini-PCIE SIM COM Europe (11069046)
4G2 = Modem 4G mini-PCIE SIM COM South-America (11069055)
Storage
blank = nothing
S1 = extern SSd 256GBSD
S2 = ex extern SSd 512GBSD
Heater
blank = nothing
H = Heater
CABLED COMMUNICATION
E = Ethernet 10/100/1000
O1 = Multi-mode Fiber Optic Converter 10/100
O2 = Multi-mode Fiber Optic Converter 10/100/1000



RADIO MODULE - - TECHNICAL DATA DECLARED BY THE MANUFACTURER

ASK Radio Receiver - NF S32-002



Power supply
Module must be powered with +5VDC +/-10%.
An input low pass filter with R = 10 Ohms and C = 1µF can be used to reduce module power supply ripple.

Power consumption
Active power consumption is typically 6mA at 5V / +25°C, and maximum 8mA over full temperature range.
Power down power consumption if typically 1mA @25°C, and maximum 1.5mA over full temperature range.

Temperature
Module can be used under industrial -40°C / +85°C range.

Signals
ENABLE input must be tied high to set module in active mode. An internal 47 KOhms pull-down resistor is used on this input. Input voltage on this pin must be under 0.7V to ensure power-down, above 3.5V to ensure powerup, and must not exceed VCC+0.2V.
TRIG_OUT output goes low for 750ms when a valid radio signal is received. Most remote controls tested send multiple frames to ensure transmission, so output active time duration can be increased by the length of frames received. The TRIG_OUT stage consists in a small bipolar transistor coupled with a 47 KOhms pull-up resistor to VCC.
If application requires an open collector output without pull-up to VCC, the R3 resistor can be unsoldered (placed close to the TRIG_OUT pin). In this case Vceo max voltage must not exceed 40V and current drawn must be lower than 50mA. Take care avoiding noisy signals (switching power supplies, high speed logic, radio transmitters) running close to the receiver.

Radio characteristics
ASK receiver
Module is compliant with NF S32-002 specifications. Nominal center frequency : 868.3 MHz.

Frame decoding
Module frame decoding is ensured by a microcontroller clocked by a crystal. Module tolerates transmitter framing clock deviation over +/-5% range (most remote controls use an unprecise clock). Noise rejection is ensure by an algorithm that validates signal after decoding a minimum number of contiguous frame repetitions.

RADIO MODULE - - TECHNICAL DATA DECLARED BY THE MANUFACTURER

Simcom SIM7100E

General features	**Specifications for Data transfer**
Five-Band FDD-LTE B1/B3/B7/B8/B20 Dual-Band TDD-LTE B38/B40 Dual-Band UMTS/HSDPA/HSPA+ B1/B8 Dual-Band GSM/GPRS/EDGE 900/1800 MHz Control Via AT Commands Supply voltage range: 3.4V~ 4.2V Operation temperature: -40℃ to +85℃ Dimension: 30 X 30X 2.9 mm Weight: 5.8g GNSS: gpsOne Gen 8B;standalone;assisted,XTRA;	LTE •Uplink up to 50Mbps •Downlink up to 100Mbps HSPA+ •Uplink up to 5.76 Mbps •Downlink up to 42 Mbps UMTS •Uplink/Downlink up to 384Kbps EDGE Class: •Max. 236.8Kbps(DL),Max. 236.8Kbps(UL) GPRS •Max. 85.6Kbps(DL), Max. 85.6Kbps(UL) CSD •GSM data rate 14.4Kbps •WCDMA data rate 57.6Kbps •WCDMA 64kbps CSD for Video call
Other features	**Interfaces**
USB Driver for Microsoft Windows2000/XP/Vista/7/8 USB Driver for Windows CE/Mobile USB Driver for Linux /Android RIL supporting for Android/Windows CE/Mobile Automatic installation for windows Linux API SDK Firmware update via USB TCP/IP/IPV4/V6 Multi-PDP,MT PDP FTP/FTPS/HTTP/HTTPS/SMTP/POP3/DNS/MMS DTMF Gobi SDK to the Win7/Win8/Linux MBIM to Win8 Source code of the PC manager of the device for reference	USB2.0 UART SIM card SPI I2C Keypad(5*5) Constant current sink GPIO ADC PCM SDIO

COMPONENTI AUSILIARI / *ANCILLARY EQUIPMENTS*		
Description	**Manufacturer**	**Model name**
RADIO TEST SET	R&S	CMW500
Remote control	Aesys	---

MODALITA' DI FUNZIONAMENTO / OPERATING MODES		
Operation mode		**Description**
#1	TFT ON Radio links activated	Moving image displayed on TFT Cellular radio link established with Test set. 868MHz radio module receiving commands from remote control

CRITERI DI VALUTAZIONE PER I TEST DI IMMUNITA' / *COMPLIANCE CRITERIA FOR IMMUNITY TESTS*

According to 50121-1:

The variety and the diversity of the apparatus within the scope of this set of standards makes it difficult to define precise criteria for the evaluation of the immunity test results. If, as a result of the application of the tests defined in this set of standards, the apparatus becomes dangerous or unsafe, the apparatus shall be deemed to have failed the test. A functional description and a definition of performance criteria, during or as a consequence of the EMC testing, shall be provided by the manufacturer and noted in the test report, based on the following criteria:

Performance criterion A: The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.
Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data isallowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.
Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls

According to ETSI EN 301 489-1

if no further details are given in the relevant part of EN 301 489 series dealing with the particular type of radio equipment, the following general performance criteria for continuous phenomena shall apply:

Performance criteria for continuous phenomena applied to transmitters and receivers: During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance. During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data. If the minimum performance level of the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criteria for transient phenomena applied to transmitters and receivers: After the test, the apparatus shall continue to operate as intended. No degradation or loss of function is allowed below a permissible performance level specified by the manufacturer, when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance. During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (eg unintended transmission) or stored data is allowed. If the minimum performance level of the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criteria for equipment which does not provide a continuous communication link: For radio equipment which does not provide a continuous communication link, the performance criteria described in 1. And 2. Are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in 1. And 2.

Performance criteria for ancillary equipment tested on a stand alone basis: If ancillary equipment is intended to be tested on a stand alone basis, the performance criteria described in 1. And 2. Are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation.
The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in 1. And 2.

According to ETSI EN 301 489-3

For the purposes of the present document the provisions of ETSI EN 301 489-1 [1], clause 6, shall not apply. The performance criteria are used to make an assessment whether a radio equipment passes or fails immunity tests.

In the table below:

- performance criterion A applies for immunity tests with phenomena of a continuous nature;
- performance criterion B applies for immunity tests with phenomena of a transient nature.

NOTE: Whether a phenomenon is considered transient, continuous or otherwise is indicated in the test procedures for the phenomenon in ETSI EN 301 489-1 [1], clause 9.

Criterion	During test	After test
A	Operate as intended No loss of function No unintentional responses	Operate as intended No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May show loss of function No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions

According to ETSI EN 301 489-52

GSM and DCS Performance Criteria

The equipment shall meet the performance criteria specified in this clause and clauses 6.1.1 to 6.1.4, as appropriate. Portable equipment intended for use whilst powered by the main battery of a vehicle shall additionally fulfil the applicable requirements set out in ETSI EN 301 489-1 [1], clauses 7.1 and 7.2 for mobile equipment. Portable or mobile equipment powered by the AC mains shall additionally fulfil the applicable requirements of ETSI EN 301 489-1 [1], clauses 7.1 and 7.2 for radio and ancillary equipment for fixed use. The establishment and maintenance of a communications link, the assessment of RXQUAL, and the assessment of the audio breakthrough by monitoring the speech output signal level, are used as performance criteria to ensure that all primary functions of the transmitter and receiver are evaluated during the immunity tests. In addition, the test shall also be performed in idle mode to ensure the transmitter does not unintentionally operate. The maintenance of a communications link shall be assessed using an indicator which may be part of the test system or the EUT. If an equipment is of a specialized nature, such that the performance criteria described in the following clauses are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in the following clauses.

Performance criteria for Continuous phenomena applied to Transmitters (CT)

A communication link shall be established at the start of the test, and maintained during the test, see clauses 4.2.3 and 4.2.4. During the test, the uplink speech output level shall be at least 35 dB less than the previously recorded reference levels, when measured through an audio band pass filter of width 200 Hz, centred on 1 kHz (audio breakthrough check). NOTE: When there is a high level background noise present the filter bandwidth can be reduced down to a minimum of 40 Hz. At the conclusion of the test, the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained. In addition to confirming the above performance during a call, the test shall also be performed in idle mode, and the transmitter shall not unintentionally operate.

Performance criteria for Transient phenomena applied to Transmitters (TT)

A communications link shall be established at the start of the test, see appropriate clauses 4.2 to 4.2.4. At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link. At the conclusion of the total test comprising the series of individual exposures, the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communication link shall have been maintained. In addition to confirming the above performance during a call, the test shall also be performed in idle mode, and the transmitter shall not unintentionally operate.

Performance criteria for Continuous phenomena applied to Receivers (CR)

A communications link shall be established at the start of the test, see appropriate clauses 4.2 to 4.2.6. During the test, the RXQUAL of the downlink shall not exceed the value of three, measured during each individual exposure in the test sequence. During the test, the downlink speech output level shall be at least 35 dB less than the previously recorded reference levels, when measured through an audio band pass filter of width 200 Hz, centred on 1 kHz (audio breakthrough check). NOTE: When there is a high level background noise present the filter bandwidth can be reduced down to a minimum of 40 Hz. At the conclusion of the test, the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained.

Performance criteria for Transient phenomena applied to Receivers (TR)

A communications link shall be established at the start of the test, see appropriate clauses 4.2. to 4.2.6. At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link. At the conclusion of the total test comprising the series of individual exposures, the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communication link shall have been maintained.

Performance criteria for ancillary equipment tested on a stand alone basis

The provision of ETSI EN 301 489-1 [1], clause 6.4 shall apply.

CDMA Direct Spread (UTRA and E-UTRA) Performance Criteria

The equipment shall meet the performance criteria specified in this clause and clauses 6.2.2 and 6.2.3 as appropriate. The maintenance of a communications link shall be assessed by using an indicator, which may be part of the test system or the equipment under test. If an equipment is of a specialized nature, that the performance criteria described in the following clauses are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after testing, as required by the present document. The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in the following clauses. In addition, the test shall also be performed in idle mode to ensure the transmitter does not unintentionally operate. The requirements apply to all types of UTRA and E-UTRA (FDD or TDD) for the UE.

Performance criteria for continuous phenomena

A communication link shall be established at the start of the test, and maintained during the test, clauses 4.1 and 4.2. In the speech mode, the performance criteria shall be that the Up Link and Down Link speech output levels shall be at least 35 dB less than the recorded reference levels, when measured through an audio band pass filter of width 200 Hz, centred on 1 kHz (annex B). NOTE: When there is a high level of background audio noise present, the filter bandwidth can be reduced down to a minimum of 40 Hz. At the conclusion of the test, the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained. In addition to confirming the above performance in traffic mode, the test shall be performed in idle mode, and the transmitter shall not unintentionally operate.

UTRA

In the data transfer mode, the performance criteria can be one of the following:

- if the BER (as referred in ETSI TS 134 109 [4]) is used, it shall not exceed 0,001 during the test sequence;
- if the BLER (as referred in ETSI TS 134 109 [4]) is used, it shall not exceed 0,01 during the test sequence.

The BLER calculation shall be based on evaluating the CRC on each transport block

E-UTRA

In the data transfer mode, the performance criteria shall be that the throughput shall be ≥ 95 % of the maximum throughput of the reference measurement channel as specified in annex C in ETSI TS 136 101 [9] with parameters specified in tables 7.3.1-1 and 7.3.1-2 in ETSI TS 136 101 [9] during the test sequence.

Performance criteria for Transient phenomena

A communications link shall be established at the start of the test, clauses 4.1 and 4.2. At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link. At the conclusion of the total test comprising the series of individual exposures, the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communication link shall have been maintained. In addition to confirming the above performance in traffic mode, the test shall also be performed in idle mode, and the transmitter shall not unintentionally operate.

Representative parameter	Acceptable level of performance	Observation mode		
		Acquisition	Test equipment	Test n.
Displayed moving image	The image has to be displayed as at the beginning of the test	By visualization	Operator	All immunity tests
GSM/UMTS/LTE radio link	No radio link interruption	By visualization	Test set	All immunity tests
RF link (868MHz)	Continuous reception of radio commands	listening acoustic messages from EUT	Operator	All immunity tests

Reference Document		Title of Document
EN 50121-4	2016*	Railway applications - Electromagnetic compatibility Part 4: Emission and immunity of the signalling and telecommunications apparatus
EN 50121-1	2017*	Railway applications - Electromagnetic compatibility Part 1: General
EN 55024	2010*	Information technology equipment - Immunity characteristics - Limits and methods of measurement
EN 55032	2015*	Electromagnetic compatibility of multimedia equipment - Emission Requirements
EN 61000-6-4 A1	2007* 2011*	Electromagnetic compatibility (EMC) Part 6-4: Generic standards - Emission standard for industrial environments
EN 61000-3-2	2014*	Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)" is an international standard concerning the harmonics emitted by electric equipment.
EN 61000-3-3	2013*	Electromagnetic compatibility (EMC) Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection
EN 61000-4-2	2007*	Electromagnetic compatibility (EMC) Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test
EN 61000-4-3 A1 A2	2006* 2007 2010	Electromagnetic compatibility (EMC) Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4	2012*	Electromagnetic compatibility (EMC) Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test
EN 61000-4-5	2014*	Electromagnetic compatibility (EMC) Part 4-5: Testing and measurement techniques – Surge immunity test
EN 61000-4-6	2014*	Electromagnetic compatibility (EMC) Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8	2010*	Electromagnetic compatibility (EMC) Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
EN 61000-4-9	2016*	Electromagnetic compatibility (EMC) Part 4-9: Testing and measurement techniques Pulse magnetic field immunity test
EN 61000-4-11	2004*	Electromagnetic compatibility (EMC) Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests

Reference Document	Title of Document
ETSI EN 301 489-1 V2.1.1	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU
ETSI EN 301 489-3 V2.1.1	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
ETSI EN 301 489-52 V1.1.0 (Draft)	Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
ETSI EN 303 446-2 V1.1.0 (Draft)	ElectroMagnetic Compatibility (EMC) standard for combined and/or integrated radio and non-radio equipment; Part 2: Specific conditions for equipment intended to be used in industrial locations; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

* For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

SOMMARIO DELLE PROVE / *TESTS SUMMARY*

RADIATED IMMUNITY - IMMUNITA' RADIATA **23**

RADIATED EMISSION – EMISSIONE RADIATA **26**

CONDUCTED EMISSION – EMISSIONE CONDOTTA **31**

HARMONIC CURRENTS – ARMONICHE DI CORRENTE **35**

FLICKER – FLICKER **40**

ELECTROSTATIC DISCHARGE – SCARICHE ELETTROSTATICHE **42**

FAST TRANSIENTS - TRANSITORI VELOCI **45**

SURGES - IMPULSI **48**

INJECTED CURRENTS - CORRENTI INIETTATE **52**

VOLTAGE DIPS AND SHORT INTERRUPTION – BUCHI E INTERRRUZIONE DI TENSIONE **55**

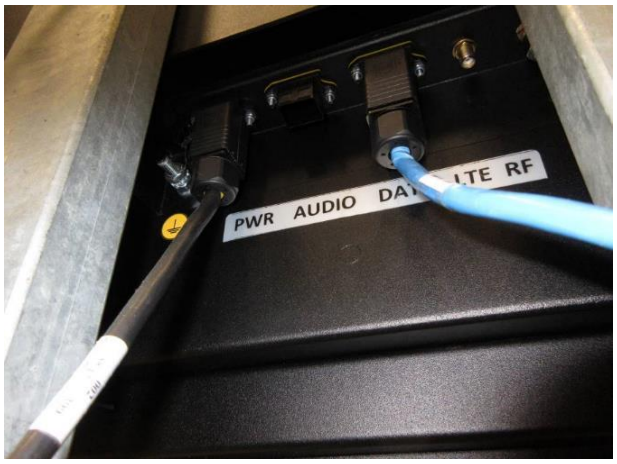
MAGNETIC FIELD - CAMPO MAGNETICO **59**

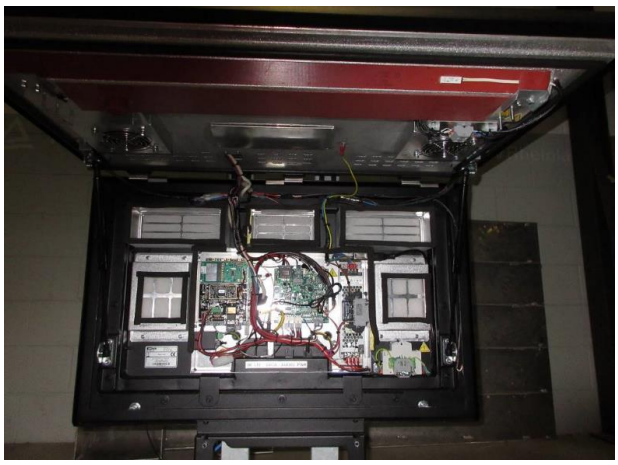
ESITO DELLE PROVE DI EMISSIONE / *EMISSION TESTS RESULT*		
Prova / Test	**Porta / Port**	**Esito / Result**
Emissione condotta / *Continuous disturbance voltage*	AC mains TLC ports	COMPLIANT COMPLIANT
Emissione radiata / *Radiated disturbance*	Enclosure	COMPLIANT
Armoniche di corrente */ Harmonic current emissions*	AC mains	COMPLIANT
Flicker e oscillazioni di tensione / *Voltage fluctuations and flicker*	AC mains	COMPLIANT

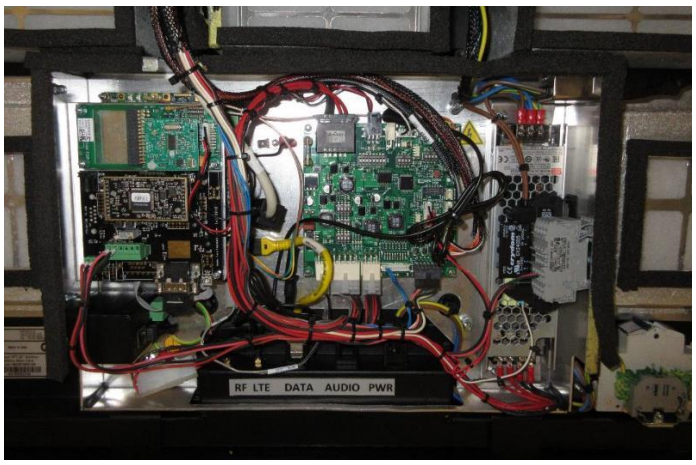
ESITO DELLE PROVE DI IMMUNITA' / *IMMUNITY TESTS RESULT*		
Prova / Test	**Porta / Port**	**Esito / Result**
Scariche Elettrostatiche / *Electrostatic discharges*	Enclosure	COMPLIANT
Immunità radiata / *Radiated electromagnetic field*	Enclosure	COMPLIANT
Transitori veloci di tensione / *Electrical Fast Transients*	AC mains TLC port	COMPLIANT COMPLIANT
Impulsi / *Surge*	AC mains	COMPLIANT
Immunità condotta / *Injected currents*	AC mains TLC port	COMPLIANT COMPLIANT
Buchi e interruzioni brevi di tensione / *Dips and Short interruptions*	AC mains	COMPLIANT
Campo magnetico a frequenza di rete / *Power frequency magnetic field*	Enclosure	COMPLIANT

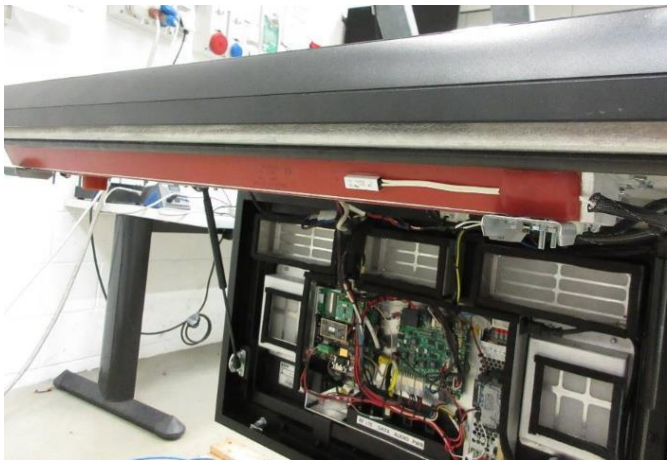
Compliant = Result within the limits
N/A = Not Applicable
N/R = Not requested by the Client

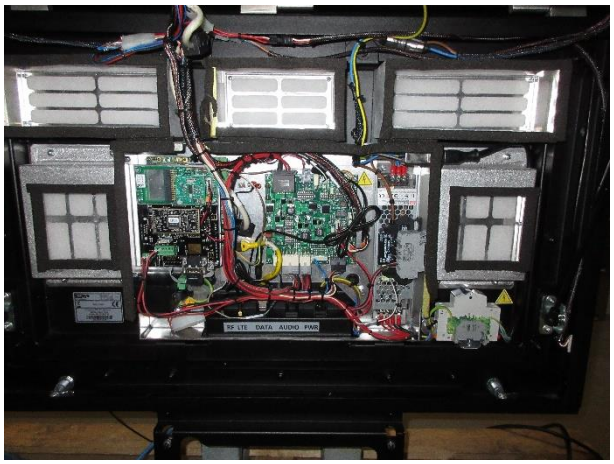
DOCUMENTAZIONE FOTOGRAFICA / *PHOTOGRAPHIC DOCUMENTATION*

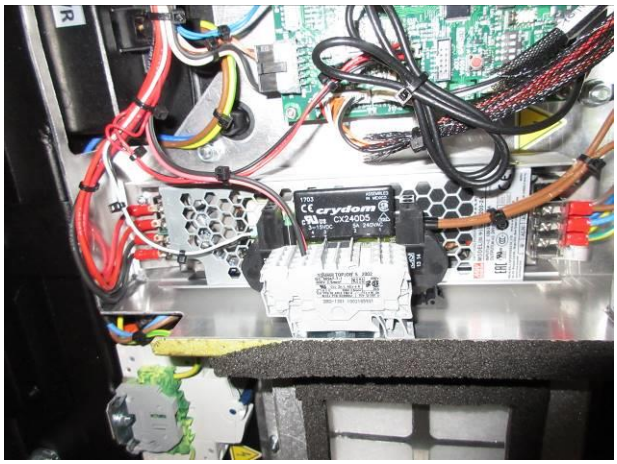

PWR AUDIO

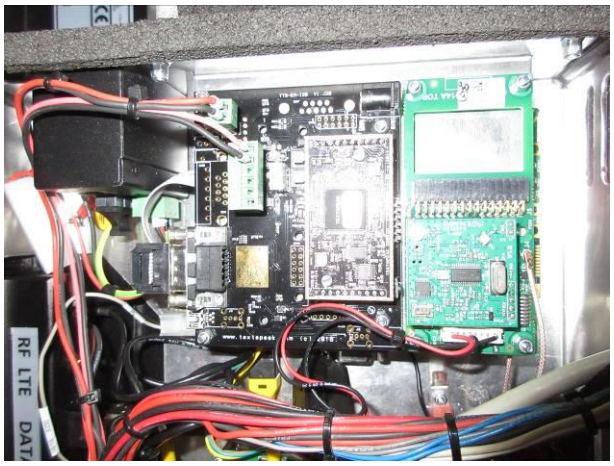



RF LTE DATA AUDIO PWR

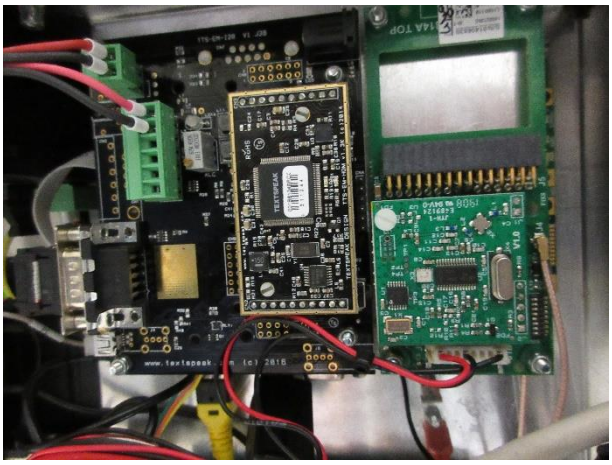





crydom
CX240D5


RF LTE

UI2
UCHIYA
110C
3
164



Test N.1	**RADIATED IMMUNITY** - *IMMUNITA´ RADIATA*

Reference Standard	EN 61000-4-3
List of reference equipment	➢ Semianechoic Chamber ETS-Lindgren mod.FACT3 (Inv. 8020484) ➢ RF Generator Rohde&Schwarz mod.SMB100A (Inv. 87020456) ➢ RF Amplifier Vectawave mod.VBA 1000-275 (Inv. 87020472) ➢ RF Amplifier Bonn mod.BLMA 1060-75/50D (Inv.87020473) ➢ Directional Coupler CMC mod.441499 (Inv.87020478) ➢ Directional Coupler Werlatone mod.C8000-102 (Inv.87020479) ➢ Antenna Log-periodica ETS-Lindgren mod.3150B (Inv. 87020464) ➢ Antenna Horn ETS-Lindgren mod.3119 (Inv. 87020462)
Measurement Uncertainty	Expanded uncertainty in the range (20 MHz – 6 GHz): 6,1 dB Coverage probability: 95 % Coverage factor: 2,0

Number of samples under test	1

Test Conditions	**Required**	**Measured**
Ambient Temperature	(15 ÷ 35) °C	(21.4 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(49.8 ± 10) %rH

Test Setup	EN 61000-4-3
Test Procedure	EN 61000-4-3
EUT Operating Mode(s)	#1

Test Results (reference with EN 50121-4) – 50Hz

Tested Port	Disturbance Characteristics			Notes	Acceptance criteria	Result
	Level (V/m)	Frequency (GHz)	Modulation			
Enclosure	10	0.08 – 0.8	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria in accordance to EN 50121-1
Enclosure	20	0.8 – 1.0	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria in accordance to EN 50121-1
Enclosure	10	1.4– 2.0	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria in accordance to EN 50121-1
Enclosure	5	2.0-2.7	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria in accordance to EN 50121-1
Enclosure	3	5.1-6.0	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria in accordance to EN 50121-1

Test Results (reference with EN 50121-4) – 60Hz

Tested Port	Disturbance Characteristics			Notes	Acceptance criteria	Result
	Level (V/m)	Frequency (GHz)	Modulation			
Enclosure	10	0.08 – 0.8	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria in accordance to EN 50121-1
Enclosure	20	0.8 – 1.0	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria in accordance to EN 50121-1
Enclosure	10	1.4– 2.0	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria in accordance to EN 50121-1
Enclosure	5	2.0-2.7	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria in accordance to EN 50121-1
Enclosure	3	5.1-6.0	1kHz, AM 80%	No performance degradation	A	Complies within acceptance criteria in accordance to EN 50121-1

Test Results (With reference to EN 55024) – 50Hz

Tested Port	Disturbance Characteristics			Notes	Result classification	Result
	Level (V/m)	Frequency (GHz)	Modulation			
Enclosure	3	0.08 – 1.0	1kHz, AM 80%	No loss of radio link	A	Complies within acceptance criteria in accordance to EN 55024

Test Results (With reference to EN 55024) – 60Hz

Tested Port	Disturbance Characteristics			Notes	Result classification	Result
	Level (V/m)	Frequency (GHz)	Modulation			
Enclosure	3	0.08 – 1.0	1kHz, AM 80%	No loss of radio link	A	Complies within acceptance criteria in accordance to EN 55024

Test N.2	***RADIATED EMISSION –*** *EMISSIONE RADIATA*

Test performed according to	EN 61000-6-4
List of reference equipment	➢ Semi-Anechoic Chamber ETS Lindgren mod. FACT3 (Inv. 87020484) ➢ EMI Test Receiver R&S mod.ESU40 (Inv. 87020455) ➢ Antenna BiLog with Preamplifier ETS Lindgren mod.3124E-PA (Inv. 87020457)
Measurement Uncertainty	Expanded uncertainty (30 – 1000) MHz: 5,9 dB Expanded uncertainty (1 – 3,6) GHz: 5,9 dB Expanded uncertainty (3,6 – 8) GHz: 6,4 dB Expanded uncertainty (8 – 40) GHz: 7,3 dB Coverage probability: 95 % Coverage factor: 2,0

Number of samples under test	1

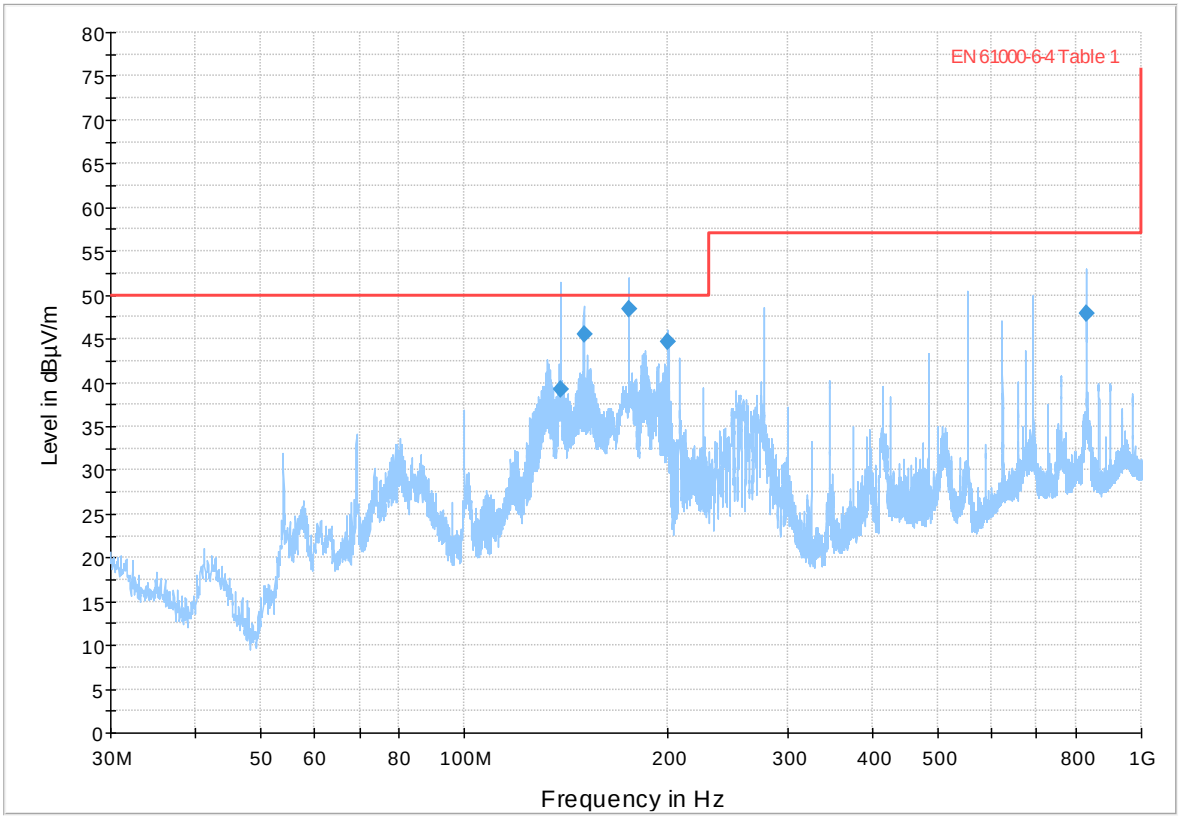
Test Conditions	**Required**	**Measured**
Ambient Temperature	(15 ÷ 35) °C	(19 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(45 ± 10) %rH

Test Setup	EN 61000-6-4 par 4
Test Procedure	EN 61000-6-4 par 4
EUT Operating Mode(s)	#1
Acceptance Criteria	Class A EUT: limits are indicated in EN 61000-6-4

Test Results 30-1000 MHz

EUT Operating Mode(s) #1 (230V - 50Hz)

Full Spectrum

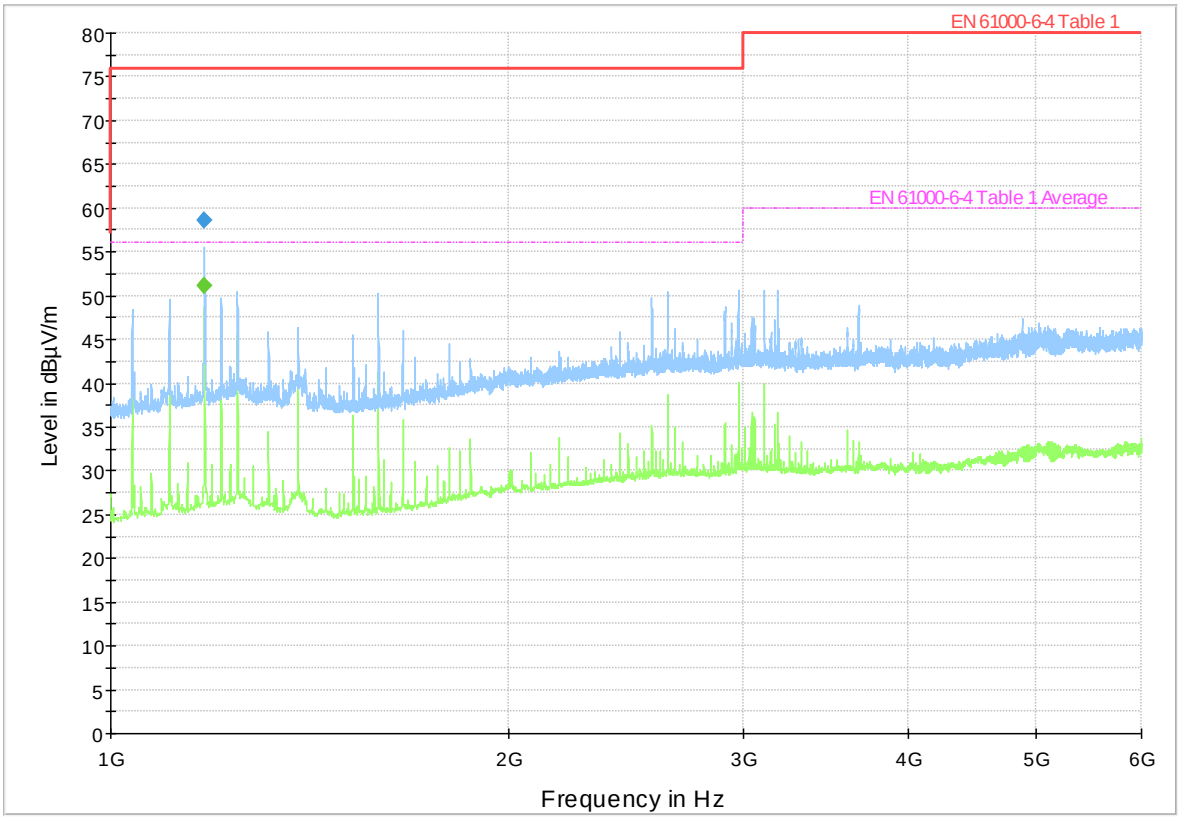


Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
138.510000	39.20	50.00	10.80	175.0	H	113.0
150.000000	45.54	50.00	4.46	104.0	V	175.0
174.990000	48.43	50.00	1.57	112.0	H	256.0
200.010000	44.69	50.00	5.31	100.0	H	283.0
831.000000	47.90	57.00	9.10	100.0	V	36.0

Test Results 1-6 GHz

EUT Operating Mode(s) #1 (230V - 50Hz)

Full Spectrum

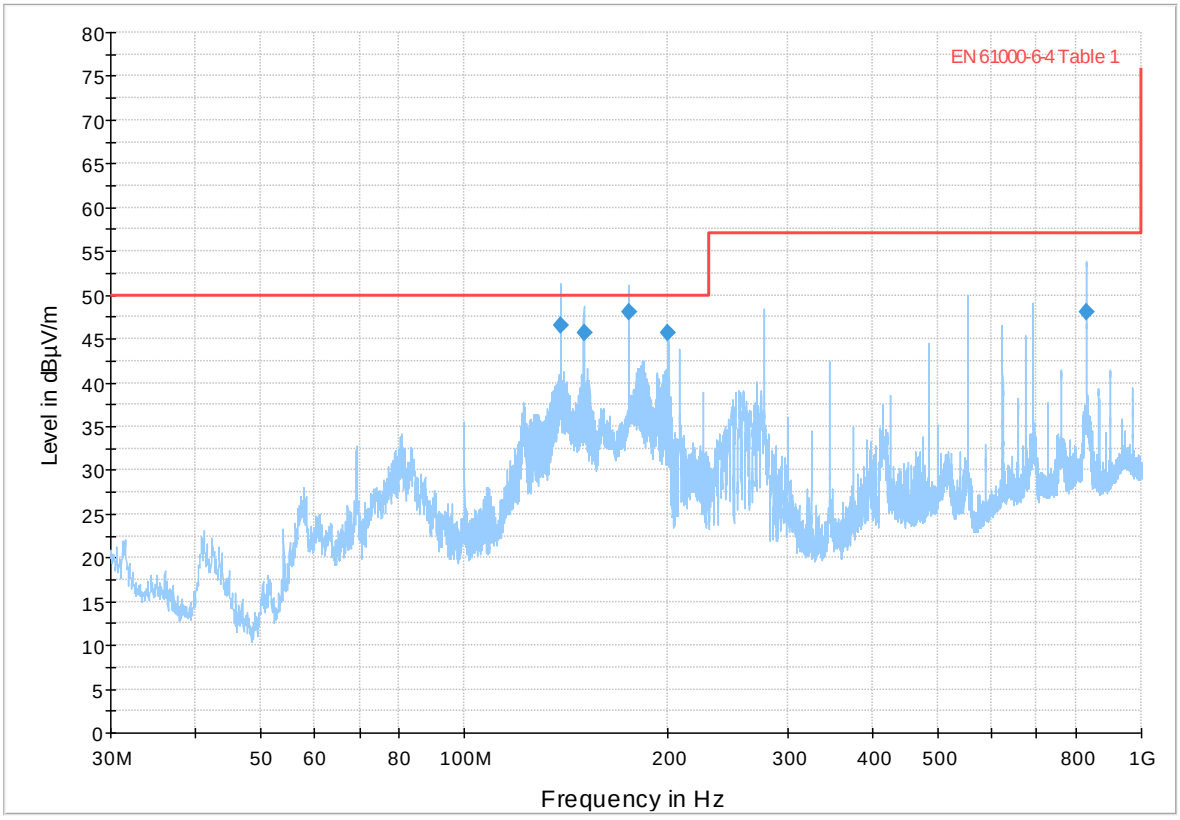


Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
1177.250000	---	51.15	56.00	4.85	125.0	V	0.0
1177.250000	58.65	---	76.00	17.35	125.0	V	349.0

Test Results 30-1000 MHz

EUT Operating Mode(s) #1 (230V - 60Hz)

Full Spectrum

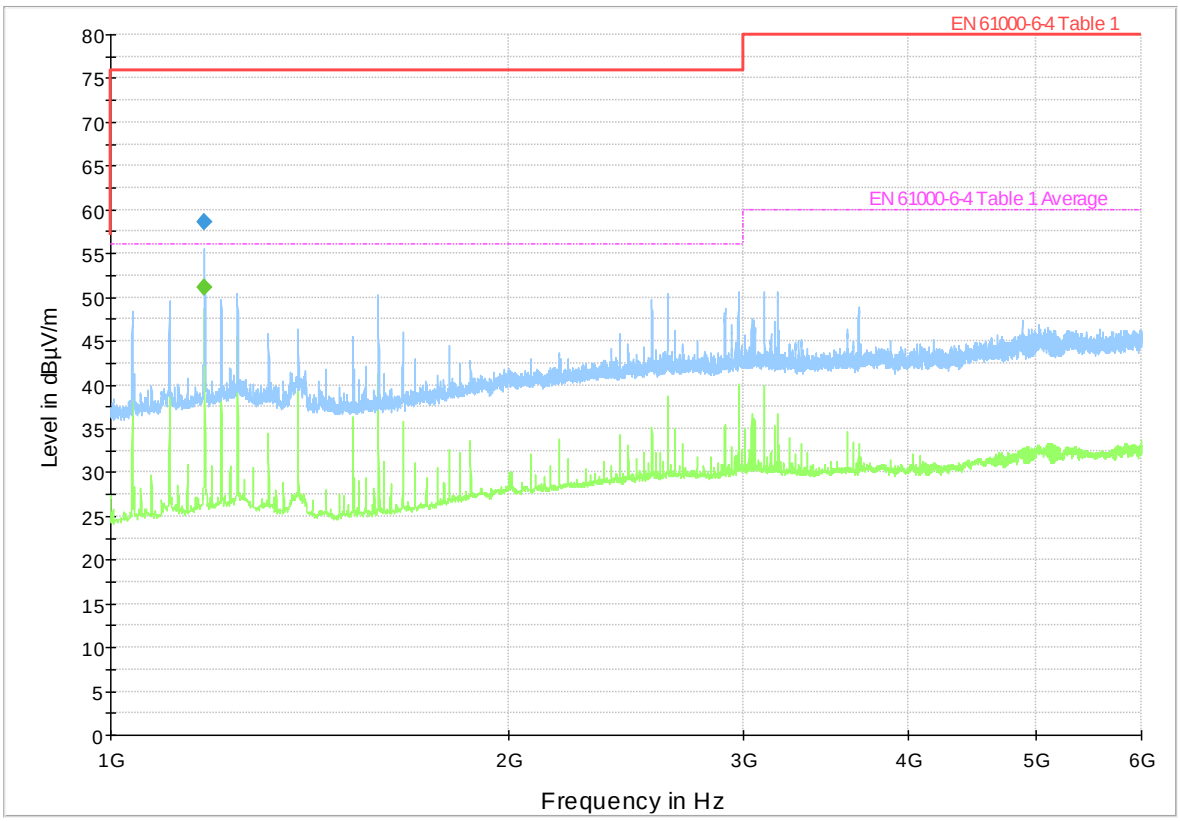


Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
138.480000	46.46	50.00	3.54	113.0	V	351.0
150.000000	45.73	50.00	4.27	100.0	V	194.0
174.990000	48.15	50.00	1.85	112.0	H	254.0
200.010000	45.69	50.00	4.31	125.0	H	282.0
830.970000	48.00	57.00	9.00	100.0	V	34.0

Test Results 1-6 GHz

EUT Operating Mode(s) #1 (230V - 60Hz)

Full Spectrum



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
1177.250000	---	51.25	56.00	4.75	125.0	V	0.0
1177.250000	58.64	---	76.00	17.36	125.0	V	349.0

Test N.3	***CONDUCTED EMISSION –*** *EMISSIONE CONDOTTA*

Reference standard	EN 61000-6-4
List of reference equipment	➢ EMI Test Receiver R&S ESW44 (Inv. 87020967) ➢ LISN R&S mod. ENV216 (Inv. 87020993) ➢ ISN Schwarzbeck mod. CAT5 8158 (inv. 87020470)
Measurement Uncertainty	Expanded uncertainty (9 kHz – 30 MHz): 3,5 dB Coverage probability: 95 % Coverage factor: 2,0

Number of samples under test	1

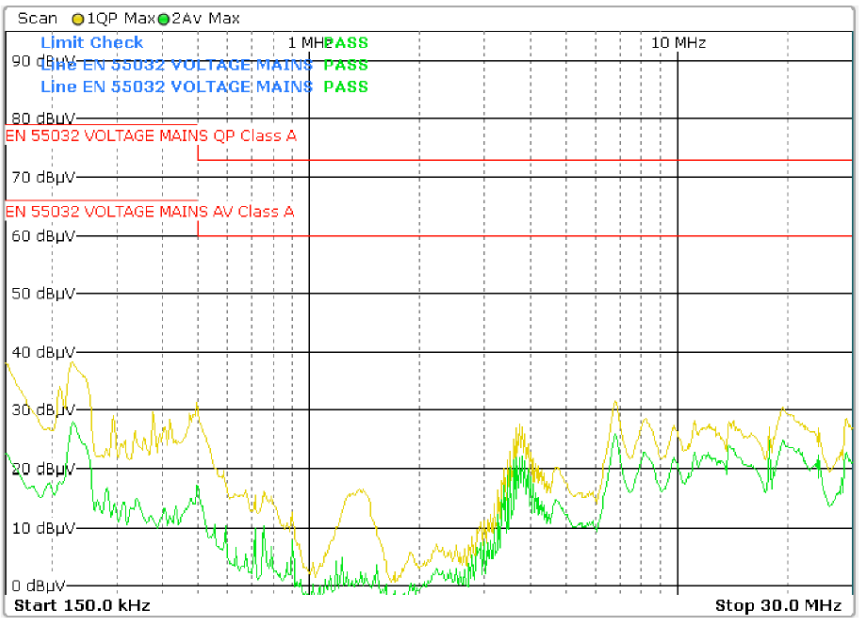
Test Conditions	**Required**	**Measured**
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(46 ± 10) %rH

Test Setup	EN 61000-6-4
Test Procedure	EN 61000-6-4
EUT Operating Mode(s)	#1
Acceptance Criteria	Class A EUT: limits are indicated in EN 61000-6-4

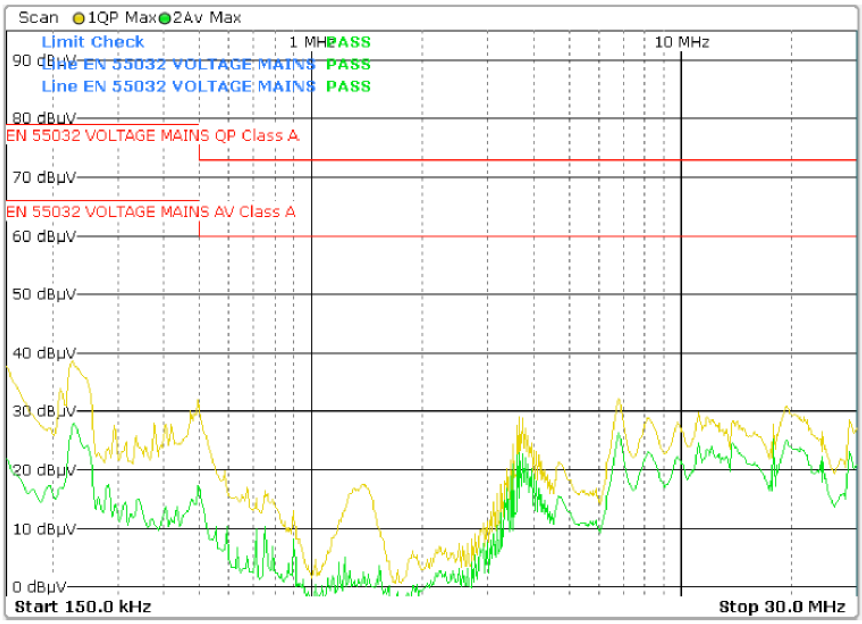
Test Results

EUT Operating Mode(s) #1 230V - 50Hz

Line 1



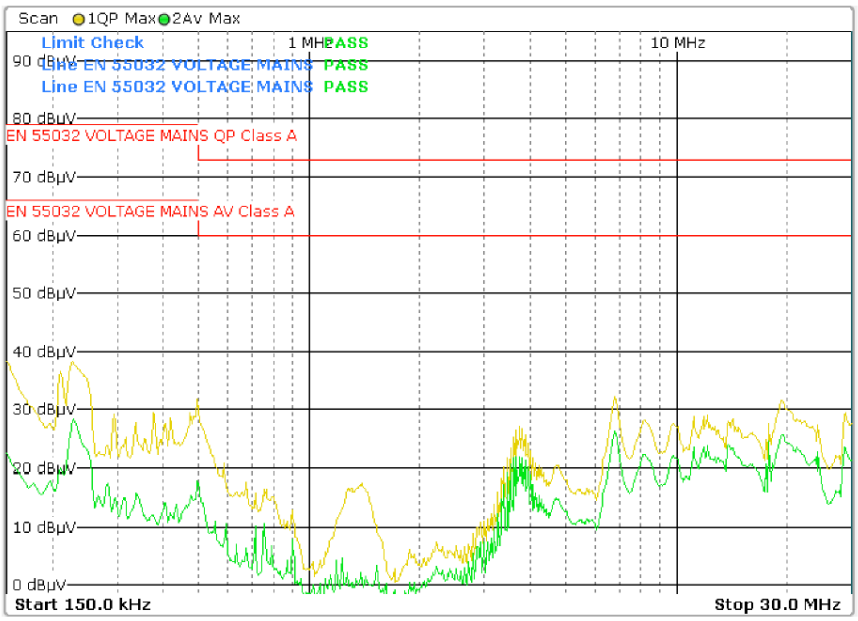
Neutral line



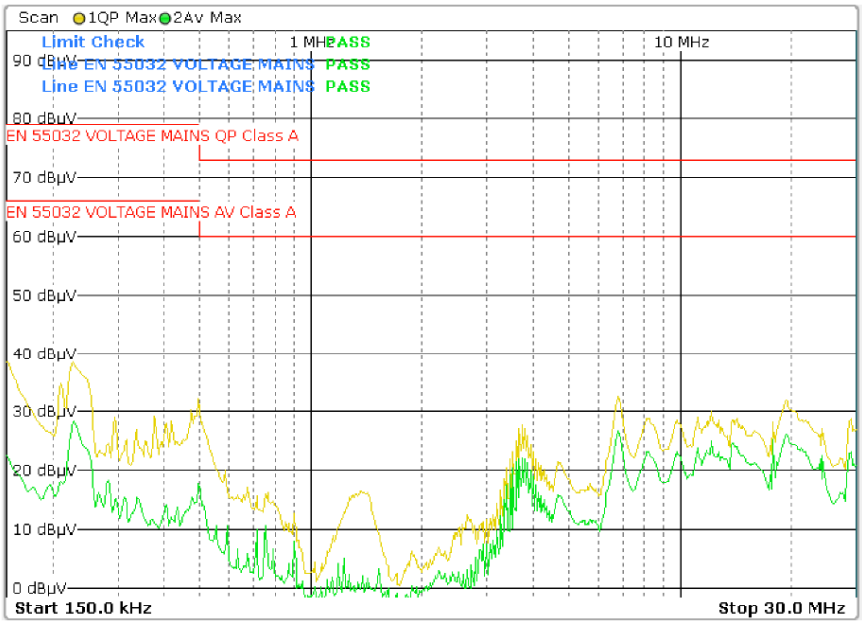
Test Results

EUT Operating Mode(s) #1 230V - 60Hz

Line 1



Neutral line

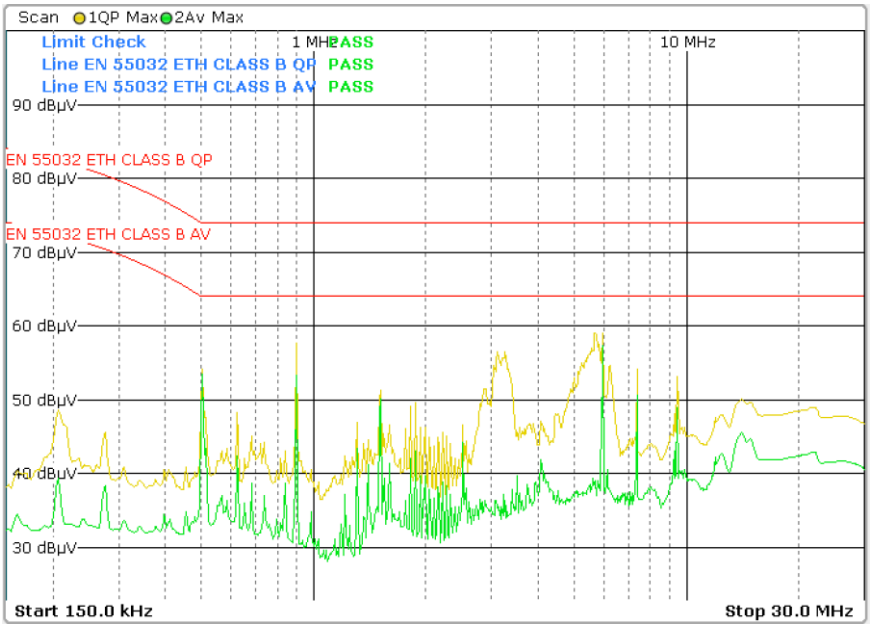


Telecom port

Test Results

EUT Operating Mode(s) #1 230V - 50Hz

Ethernet port (LAN)

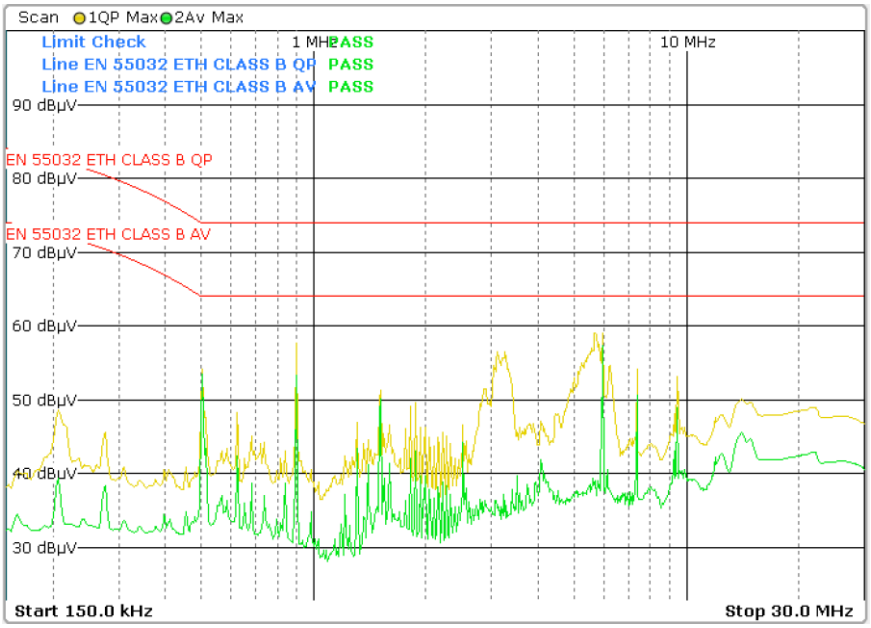


Telecom port

Test Results

EUT Operating Mode(s) #1 230V - 60Hz

Ethernet port (LAN)



Test N.4	**HARMONIC CURRENTS** – *ARMONICHE DI CORRENTE*

Reference Standard	EN 61000-3-2
List of reference equipment	➢ Stabilized Power Supply Ametek mod. MX30 (Inv. 87010273) ➢ Harmonics Analyzer EMTest mod. DPA503 (Inv. 87010274)
Measurement Uncertainty	Expanded uncertainty: 4,1% of reading Coverage probability: 95 % Coverage factor: 2,0

Number of samples under test	1

Test Conditions	**Required**	**Measured**
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(50 ± 10) %rH

Test Setup	EN 61000-3-2 Annex A
Test Procedure	EN 61000-3-2 par. 6.2
EUT Operating Mode(s)	#1
Acceptance Criteria	Limits are indicated in EN 61000-3-2, Class A

Current Test Result – 50Hz

Average and Maximum harmonic current results									
Hn	Average (100% / 150% *)				Maximum (150%)				Harmonic Result
	Ieff [A]	of Limit [%]	Limit [A]	Result	Ieff [A]	of Limit [%]	Limit [A]	Result	
1	1,654				1,696				
2	0,002	0,147	1,080	n/a	0,002	0,136	1,620	n/a	n/a
3	0,146	6,360	2,300	PASS	0,162	4,682	3,450	PASS	PASS
4	0,002	0,484	0,430	n/a	0,003	0,399	0,645	n/a	n/a
5	0,046	4,076	1,140	PASS	0,049	2,882	1,710	PASS	PASS
6	0,002	0,680	0,300	n/a	0,002	0,552	0,450	n/a	n/a
7	0,022	2,906	0,770	PASS	0,024	2,117	1,155	PASS	PASS
8	0,002	0,781	0,230	n/a	0,002	0,642	0,345	n/a	n/a
9	0,005	1,326	0,400	n/a	0,008	1,278	0,600	n/a	n/a
10	0,002	1,004	0,184	n/a	0,002	0,892	0,276	n/a	n/a
11	0,012	3,495	0,330	PASS	0,013	2,549	0,495	PASS	PASS
12	0,002	1,142	0,153	n/a	0,002	1,026	0,230	n/a	n/a
13	0,007	3,223	0,210	n/a	0,010	3,215	0,315	n/a	n/a
14	0,002	1,459	0,131	n/a	0,003	1,286	0,197	n/a	n/a
15	0,007	4,680	0,150	n/a	0,008	3,715	0,225	n/a	n/a
16	0,002	1,627	0,115	n/a	0,002	1,367	0,173	n/a	n/a
17	0,006	4,638	0,132	n/a	0,008	3,874	0,199	n/a	n/a
18	0,002	1,685	0,102	n/a	0,002	1,384	0,153	n/a	n/a
19	0,004	3,517	0,118	n/a	0,007	3,872	0,178	n/a	n/a
20	0,002	1,906	0,092	n/a	0,002	1,524	0,138	n/a	n/a
21	0,006	3,914	0,161	n/a	0,010	5,971	0,161	n/a	n/a
22	0,002	2,188	0,084	n/a	0,002	1,902	0,125	n/a	n/a
23	0,005	3,486	0,147	n/a	0,009	5,794	0,147	n/a	n/a
24	0,002	2,285	0,077	n/a	0,002	1,810	0,115	n/a	n/a
25	0,003	2,543	0,135	n/a	0,005	3,950	0,135	n/a	n/a
26	0,002	2,483	0,071	n/a	0,002	2,101	0,106	n/a	n/a
27	0,005	3,696	0,125	n/a	0,006	4,667	0,125	n/a	n/a
28	0,002	2,836	0,066	n/a	0,002	2,328	0,099	n/a	n/a
29	0,004	3,843	0,116	n/a	0,006	4,869	0,116	n/a	n/a
30	0,002	3,036	0,061	n/a	0,003	2,865	0,092	n/a	n/a
31	0,002	2,250	0,109	n/a	0,007	6,677	0,109	n/a	n/a
32	0,002	3,464	0,058	n/a	0,003	3,031	0,086	n/a	n/a
33	0,008	8,250	0,102	n/a	0,011	10,387	0,102	PASS	PASS
34	0,002	3,513	0,054	n/a	0,002	3,042	0,081	n/a	n/a
35	0,004	4,142	0,096	n/a	0,007	7,492	0,096	n/a	n/a
36	0,002	3,563	0,051	n/a	0,002	2,993	0,077	n/a	n/a
37	0,005	5,668	0,091	n/a	0,009	9,443	0,091	n/a	n/a
38	0,002	4,210	0,048	n/a	0,003	3,893	0,073	n/a	n/a
39	0,005	6,036	0,087	n/a	0,009	9,956	0,087	n/a	n/a
40	0,002	5,012	0,046	n/a	0,003	4,446	0,069	n/a	n/a

Voltage Source Verification

Harmonic voltage results				
Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	229,675	99,859		
2	0,069	0,030	0,200	PASS
3	0,091	0,040	0,900	PASS
4	0,010	0,005	0,200	PASS
5	0,038	0,016	0,400	PASS
6	0,012	0,005	0,200	PASS
7	0,040	0,017	0,300	PASS
8	0,012	0,005	0,200	PASS
9	0,044	0,019	0,200	PASS
10	0,014	0,006	0,200	PASS
11	0,032	0,014	0,100	PASS
12	0,010	0,004	0,100	PASS
13	0,030	0,013	0,100	PASS
14	0,011	0,005	0,100	PASS
15	0,031	0,014	0,100	PASS
16	0,009	0,004	0,100	PASS
17	0,022	0,010	0,100	PASS
18	0,009	0,004	0,100	PASS
19	0,016	0,007	0,100	PASS
20	0,019	0,008	0,100	PASS
21	0,022	0,010	0,100	PASS
22	0,010	0,004	0,100	PASS
23	0,014	0,006	0,100	PASS
24	0,008	0,003	0,100	PASS
25	0,013	0,006	0,100	PASS
26	0,010	0,005	0,100	PASS
27	0,017	0,008	0,100	PASS
28	0,008	0,004	0,100	PASS
29	0,018	0,008	0,100	PASS
30	0,009	0,004	0,100	PASS
31	0,017	0,008	0,100	PASS
32	0,008	0,003	0,100	PASS
33	0,019	0,008	0,100	PASS
34	0,008	0,004	0,100	PASS
35	0,018	0,008	0,100	PASS
36	0,008	0,003	0,100	PASS
37	0,018	0,008	0,100	PASS
38	0,010	0,004	0,100	PASS
39	0,020	0,009	0,100	PASS
40	0,017	0,007	0,100	PASS

Current Test Result – 60Hz

Average and Maximum harmonic current results									
Hn	Average (100% / 150% *)				Maximum (150%)				Harmonic Result
	Ieff [A]	of Limit [%]	Limit [A]	Result	Ieff [A]	of Limit [%]	Limit [A]	Result	
1	0,371				0,376				
2	0,002	0,172	1,080	n/a	0,002	0,150	1,620	n/a	n/a
3	0,047	2,023	2,300	PASS	0,048	1,386	3,450	PASS	PASS
4	0,002	0,453	0,430	n/a	0,002	0,358	0,645	n/a	n/a
5	0,009	0,815	1,140	PASS	0,010	0,582	1,710	PASS	PASS
6	0,002	0,739	0,300	n/a	0,003	0,589	0,450	n/a	n/a
7	0,009	1,127	0,770	PASS	0,010	0,828	1,155	PASS	PASS
8	0,002	0,798	0,230	n/a	0,002	0,620	0,345	n/a	n/a
9	0,004	0,921	0,400	n/a	0,004	0,690	0,600	n/a	n/a
10	0,002	0,977	0,184	n/a	0,002	0,771	0,276	n/a	n/a
11	0,004	1,081	0,330	n/a	0,005	0,952	0,495	n/a	n/a
12	0,002	1,367	0,153	n/a	0,002	1,037	0,230	n/a	n/a
13	0,009	4,233	0,210	PASS	0,010	3,169	0,315	PASS	PASS
14	0,002	1,497	0,131	n/a	0,002	1,161	0,197	n/a	n/a
15	0,005	3,647	0,150	PASS	0,006	2,763	0,225	PASS	PASS
16	0,002	1,421	0,115	n/a	0,002	1,136	0,173	n/a	n/a
17	0,004	2,854	0,132	n/a	0,004	2,117	0,199	n/a	n/a
18	0,002	1,601	0,102	n/a	0,002	1,242	0,153	n/a	n/a
19	0,003	2,479	0,118	n/a	0,004	2,219	0,178	n/a	n/a
20	0,002	1,676	0,092	n/a	0,002	1,254	0,138	n/a	n/a
21	0,006	3,865	0,161	PASS	0,007	4,057	0,161	PASS	PASS
22	0,002	1,979	0,084	n/a	0,002	1,527	0,125	n/a	n/a
23	0,004	2,893	0,147	n/a	0,005	3,378	0,147	n/a	n/a
24	0,002	2,185	0,077	n/a	0,002	1,686	0,115	n/a	n/a
25	0,004	2,837	0,135	n/a	0,005	3,438	0,135	n/a	n/a
26	0,002	2,287	0,071	n/a	0,002	1,706	0,106	n/a	n/a
27	0,004	3,547	0,125	n/a	0,005	3,962	0,125	n/a	n/a
28	0,002	2,520	0,066	n/a	0,002	1,960	0,099	n/a	n/a
29	0,004	3,761	0,116	n/a	0,005	4,152	0,116	n/a	n/a
30	0,002	3,053	0,061	n/a	0,002	2,360	0,092	n/a	n/a
31	0,003	2,783	0,109	n/a	0,004	3,303	0,109	n/a	n/a
32	0,002	2,725	0,058	n/a	0,002	2,067	0,086	n/a	n/a
33	0,004	3,443	0,102	n/a	0,004	3,814	0,102	n/a	n/a
34	0,002	2,910	0,054	n/a	0,002	2,222	0,081	n/a	n/a
35	0,004	3,734	0,096	n/a	0,004	4,269	0,096	n/a	n/a
36	0,002	3,357	0,051	n/a	0,002	2,698	0,077	n/a	n/a
37	0,003	3,483	0,091	n/a	0,004	4,054	0,091	n/a	n/a
38	0,002	4,083	0,048	n/a	0,002	3,178	0,073	n/a	n/a
39	0,004	4,231	0,087	n/a	0,004	4,657	0,087	n/a	n/a
40	0,002	3,542	0,046	n/a	0,002	2,926	0,069	n/a	n/a

Voltage Source Verification

Harmonic voltage results				
Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	229,710	99,874		
2	0,073	0,032	0,200	PASS
3	0,083	0,036	0,900	PASS
4	0,009	0,004	0,200	PASS
5	0,050	0,022	0,400	PASS
6	0,010	0,004	0,200	PASS
7	0,030	0,013	0,300	PASS
8	0,010	0,004	0,200	PASS
9	0,025	0,011	0,200	PASS
10	0,011	0,005	0,200	PASS
11	0,019	0,008	0,100	PASS
12	0,011	0,005	0,100	PASS
13	0,016	0,007	0,100	PASS
14	0,007	0,003	0,100	PASS
15	0,012	0,005	0,100	PASS
16	0,008	0,004	0,100	PASS
17	0,014	0,006	0,100	PASS
18	0,009	0,004	0,100	PASS
19	0,019	0,008	0,100	PASS
20	0,020	0,008	0,100	PASS
21	0,018	0,008	0,100	PASS
22	0,008	0,004	0,100	PASS
23	0,015	0,007	0,100	PASS
24	0,008	0,003	0,100	PASS
25	0,013	0,006	0,100	PASS
26	0,006	0,003	0,100	PASS
27	0,013	0,006	0,100	PASS
28	0,009	0,004	0,100	PASS
29	0,013	0,006	0,100	PASS
30	0,008	0,003	0,100	PASS
31	0,013	0,006	0,100	PASS
32	0,010	0,004	0,100	PASS
33	0,016	0,007	0,100	PASS
34	0,006	0,003	0,100	PASS
35	0,014	0,006	0,100	PASS
36	0,008	0,003	0,100	PASS
37	0,014	0,006	0,100	PASS
38	0,007	0,003	0,100	PASS
39	0,012	0,005	0,100	PASS
40	0,016	0,007	0,100	PASS

Test N.5	***FLICKER –*** *FLICKER*

Reference standard	EN 61000-3-3
List of reference equipment	➢ Stabilized Power Supply Ametek mod. MX30 (Inv. 87010273) ➢ Harmonics Analyzer EMTest mod. DPA503 (Inv. 87010274) ➢ Flicker reference Impedance EM Test mod. AIF503N32 (Inv. 87010275)
Measurement Uncertainty	Expanded uncertainty: 5,6% of reading Coverage probability: 95 % Coverage factor: 2,00
Number of samples under test	1

Test Conditions	**Required**	**Measured**
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(50 ± 10) %rH

Test Setup	EN 61000-3-3 par. 4
Test Procedure	EN 61000-3-3 par. 6
EUT Operating Mode(s)	#1
Acceptance Criteria	Limits are indicated in EN 61000-3-3 par. 5

Flicker Measurements 50Hz					
	P_{lt}	Max P_{st}	Max D_c	Max D_{max}	Max T_{max}
Line 1:	0,012	0,028	0,013	< 0,2	0
Limits:	0,65	1	3,3	4	0,5
Results:	PASS	PASS	PASS	PASS	PASS

Flicker Measurements 60Hz					
	P_{lt}	Max P_{st}	Max D_c	Max D_{max}	Max T_{max}
Line 1:	This part of IEC 61000 is applicable to electrical and electronic equipment having an input current equal to or less than 16 A per phase, intended to be connected to public low-voltage distribution systems of between 220 V and 250 V line to neutral at 50 Hz, and not subject to conditional connection.				
Limits:					
Results:					

Test N.6 — ELECTROSTATIC DISCHARGE – *SCARICHE ELETTROSTATICHE*

Reference Standard	EN 61000-4-2
List of reference equipment	➢ ESD Simulator – Discharge Impedance 330Ω / 150pF (Inv. 87020436) ➢ ESD Table (Inv. 87020560)
Measurement Uncertainty	Expanded uncertainty: 10,8% of set voltage Coverage probability: 95 % Coverage factor: 2,0
Number of samples under test	1 (double side)

Test Conditions	Required	Measured
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(50 ± 10) %rH

Test Setup	EN 61000-4-2 par. 7
Test Procedure	EN 61000-4-2 par. 8
EUT Operating Mode(s)	#1
Acceptance Criteria	B (see *COMPLIANCE CRITERIA FOR IMMUNITY TESTS)*

Test Results (with reference to EN 50121-4) – 50Hz

Nr	Discharge Point	Application mode	Level (kV)	Number of applications	Acceptance criteria	Result Classification
1	Enclosure	Contact Discharge	±6	10	B	A
2	Glass	Air Discharge	±8	10	B	A
3	HCP (front side)	Contact Discharge	±6	10	B	A
4	HCP (left side)	Contact Discharge	±6	10	B	A
5	HCP (right side)	Contact Discharge	±6	10	B	A

Test Results (with reference to EN 50121-4) – 60Hz

Nr	Discharge Point	Application mode	Level (kV)	Number of applications	Acceptance criteria	Result Classification
1	Enclosure	Contact Discharge	±6	10	B	A
2	Glass	Air Discharge	±8	10	B	A
3	HCP (front side)	Contact Discharge	±6	10	B	A
4	HCP (left side)	Contact Discharge	±6	10	B	A
5	HCP (right side)	Contact Discharge	±6	10	B	A

Test Results (with reference to EN 55024) – 50Hz

Nr	Discharge Point	Application mode	Level (kV)	Number of applications	Acceptance criteria	Result Classification
1	Enclosure	Contact Discharge	±4	10	B	A
2	Glass	Air Discharge	±8	10	B	A
3	HCP (front side)	Contact Discharge	±6	10	B	A
4	HCP (left side)	Contact Discharge	±6	10	B	A
5	HCP (right side)	Contact Discharge	±6	10	B	A

Test Results (with reference to EN 55024) – 60Hz

Nr	Discharge Point	Application mode	Level (kV)	Number of applications	Acceptance criteria	Result Classification
1	Enclosure	Contact Discharge	±4	10	B	A
2	Glass	Air Discharge	±8	10	B	A
3	HCP (front side)	Contact Discharge	±6	10	B	A
4	HCP (left side)	Contact Discharge	±6	10	B	A
5	HCP (right side)	Contact Discharge	±6	10	B	A

Test N.7	**FAST TRANSIENTS -** *TRANSITORI VELOCI*

Reference Standard	IEC/EN 61000-4-4
List of reference equipment	➢ Fast Transient/Burst Generator Em Test mod. UCS 500 N7.7 (Inv. 87020438) ➢ Capacitive coupling Clamp Em Test mod. HFK (Inv. 87020440) ➢ Software IEC.CONTROL version 5.3.1 (Inv. 87020486)
Measurement Uncertainty	Expanded uncertainty: 10,3% of set voltage Coverage probability: 95 % Coverage factor: 2,0

Number of samples under test	1

Test Conditions	**Required**	**Measured**
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(50 ± 10) %rH

Test Setup	IEC/EN 61000-4-4 par. 7
Test Procedure	IEC/EN 61000-4-4 par. 8
EUT Operating Mode(s)	#1
Acceptance Criteria	A (see *COMPLIANCE CRITERIA FOR IMMUNITY TESTS)*

Test Results (with reference to 50121-4) – 50Hz

Tested Port	Coupling mode	Burst Characteristics		Test Duration (s)	Acceptance criteria	Result Classification
		Level (kV)	Frequency (kHz)			
AC mains	L-N-PE	±2	5	120	A	A
I/O port	Capacitive clamp	±2	5	120	A	A
Earth port	PE	±1	5	120	A	A

Test Results (with reference to 50121-4) – 60Hz

Tested Port	Coupling mode	Burst Characteristics		Test Duration (s)	Acceptance criteria	Result Classification
		Level (kV)	Frequency (kHz)			
AC mains	L-N-PE	±2	5	120	A	A
I/O port	Capacitive clamp	±2	5	120	A	A
Earth port	PE	±1	5	120	A	A

Test Results (with reference to 55024) – 50Hz

Tested Port	Coupling mode	Burst Characteristics		Test Duration (s)	Acceptance criteria	Result Classification
		Level (kV)	Frequency (kHz)			
AC mains	L-N-PE	±1	5	120	A	A
I/O port	Capacitive clamp	±0,5	5	120	A	A

Test Results (with reference to 55024) – 60Hz

Tested Port	Coupling mode	Burst Characteristics		Test Duration (s)	Acceptance criteria	Result Classification
		Level (kV)	Frequency (kHz)			
AC mains	L-N-PE	±1	5	120	A	A
I/O port	Capacitive clamp	±0,5	5	120	A	A

Test N.8	***SURGES -** IMPULSI*

Reference Standard	IEC/EN 61000-4-5
List of reference equipment	➢ Surge/Burst Generator Em Test mod. UCS 500 N7.7 (Inv. 87020438) ➢ Software IEC.CONTROL version 5.3.1 (Inv. 87020486)
Measurement Uncertainty	Expanded uncertainty: 10,8% of set voltage Coverage probability: 95 % Coverage factor: 2,0

Number of samples under test	1

Test Conditions	**Required**	**Measured**
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(50 ± 10) %rH

Test Setup	IEC/EN 61000-4-5 par. 7
Test Procedure	IEC/EN 61000-4-5 par. 8
EUT Operating Mode(s)	#1
Acceptance Criteria	B (see *COMPLIANCE CRITERIA FOR IMMUNITY TESTS)*

Model double side:

Test Results (with reference to EN 50121-4) – 50Hz

Tested Port	Coupling mode (coupling impedance)	Surge Characteristics			Events	Acceptance criteria	Result Classification
		Level (kV)	Phase (°)	Repetition (min)			
AC Mains	L-N (2Ω)	+1	0° 90° 270°	1	5	A	A
AC Mains	L-N (2Ω)	-1	0° 90° 270°	1	5	A	A
AC Mains	L-PE (12Ω)	+2	0° 90° 270°	1	5	A	A
AC Mains	L-PE (12Ω)	-2	0° 90° 270°	1	5	A	A
AC Mains	N-PE (12Ω)	+2	0° 90° 270°	1	5	A	A
AC Mains	N-PE (12Ω)	-2	0° 90° 270°	1	5	A	A
Telecom port	Line to earth (42Ω)	+2	-	1	5	A	A
Telecom port	Line to earth (42Ω)	-2	-	1	5	A	A

Test Results (with reference to EN 50121-4) – 60Hz

Tested Port	Coupling mode (coupling impedance)	Surge Characteristics			Events	Acceptance criteria	Result Classification
		Level (kV)	Phase (°)	Repetition (min)			
AC Mains	L-N (2Ω)	+1	0° 90° 270°	1	5	A	A
AC Mains	L-N (2Ω)	-1	0° 90° 270°	1	5	A	A
AC Mains	L-PE (12Ω)	+2	0° 90° 270°	1	5	A	A
AC Mains	L-PE (12Ω)	-2	0° 90° 270°	1	5	A	A
AC Mains	N-PE (12Ω)	+2	0° 90° 270°	1	5	A	A
AC Mains	N-PE (12Ω)	-2	0° 90° 270°	1	5	A	A
Telecom port	Line to earth (42Ω)	+2	-	1	5	A	A
Telecom port	Line to earth (42Ω)	-2	-	1	5	A	A

Test Results (with reference to EN 55024) – 50Hz

Tested Port	Coupling mode (coupling impedance)	Surge Characteristics			Events	Acceptance criteria	Result Classification
		Level (kV)	Phase (°)	Repetition (min)			
AC Mains	L-N (2Ω)	+1	0° 90° 270°	1	5	B	A
AC Mains	L-N (2Ω)	-1	0° 90° 270°	1	5	B	A
AC Mains	L-PE (12Ω)	+2	0° 90° 270°	1	5	B	A
AC Mains	L-PE (12Ω)	-2	0° 90° 270°	1	5	B	A
AC Mains	N-PE (12Ω)	+2	0° 90° 270°	1	5	B	A
AC Mains	N-PE (12Ω)	-2	0° 90° 270°	1	5	B	A
Telecom port	Line to earth	+1	-	1	5	C	A
Telecom port	Line to earth	-1	-	1	5	C	A
Telecom port	Line to earth	+4	-	1	5	C	B
Telecom port	Line to earth	-4	-	1	5	C	B

Test N.9	***INJECTED CURRENTS -*** *CORRENTI INIETTATE*

Reference Standard	IEC/EN 61000-4-6
List of reference equipment	➢ RF Generator Rohde&Schwarz mod.SME03 (Inv. 87020448) ➢ RF Amplifier RFPA mod.RF001220-100 (Inv. 87020480) ➢ Coupling/Decoupling Network Em Test mod.M2/M3 (Inv. 87020442) ➢ 6 dB RF Attenuator Em Test mod.ATT6/75 (Inv. 87020482)
Measurement Uncertainty	Expanded uncertainty: 3,3 dB Coverage probability: 95 % Coverage factor: 2,0

Number of samples under test	1

Test Conditions	**Required**	**Measured**
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(50 ± 10) %rH

Test Setup	IEC/EN 61000-4-6 par. 7
Test Procedure	IEC/EN 61000-4-6 par. 8
EUT Operating Mode(s)	#1
Acceptance Criteria	A (see *COMPLIANCE CRITERIA FOR IMMUNITY TESTS)*

Test Results (with reference to 50121-4) – 50Hz

Tested Port	Test frequency (MHz)	Disturbance Characteristics			Coupling device	Acceptance criteria	Result classification
		Level (V)	Dwell time (s)	Modulation Freq.			
AC mains	0,15 ÷ 80	10	3	1kHz 80%	CDN M3	A	A
Telecom port	0,15 ÷ 80	10	3	1kHz 80%	EM Clamp	A	A
Earth port	0,15 ÷ 80	10	3	1kHz 80%	CDN M3	A	A

Test Results (with reference to 50121-4) – 60Hz

Tested Port	Test frequency (MHz)	Disturbance Characteristics			Coupling device	Acceptance criteria	Result classification
		Level (V)	Dwell time (s)	Modulation Freq.			
AC mains	0,15 ÷ 80	10	3	1kHz 80%	CDN M3	A	A
Telecom port	0,15 ÷ 80	10	3	1kHz 80%	EM Clamp	A	A
Earth port	0,15 ÷ 80	10	3	1kHz 80%	CDN M3	A	A

Test Results (with reference to 55024) – 50Hz

Tested Port	Test frequency (MHz)	Disturbance Characteristics			Coupling device	Acceptance criteria	Result classification
		Level (V)	Dwell time (s)	Modulation Freq.			
AC mains	0,15 ÷ 80	3	3	1kHz 80%	CDN M3	A	A
Telecom port	0,15 ÷ 80	3	3	1kHz 80%	EM Clamp	A	A

Test Results (with reference to 55024) – 60Hz

Tested Port	Test frequency (MHz)	Disturbance Characteristics			Coupling device	Acceptance criteria	Result classification
		Level (V)	Dwell time (s)	Modulation Freq.			
AC mains	0,15 ÷ 80	3	3	1kHz 80%	CDN M3	A	A
Telecom port	0,15 ÷ 80	3	3	1kHz 80%	EM Clamp	A	A

Test N.10	***VOLTAGE DIPS AND SHORT INTERRUPTION –*** *BUCHI E INTERRRUZIONE DI TENSIONE*

Reference Standard	IEC/EN 61000-4-11
List of reference equipment	➢ Stabilized Power Supply Ametek mod. MX30 (Inv. 87010273) ➢ Software MXGUI
Measurement Uncertainty	Expanded uncertainty: 3,8% of set voltage Coverage probability: 95% Coverage factor: 2,0
Number of samples under test	1

Test Conditions	Required	Measured
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %rH	(50 ± 10) %rH

Test Setup	IEC/EN 61000-4-11 par. 7
Test Procedure	IEC/EN 61000-4-11 par. 8
EUT Operating Mode(s)	#1
Acceptance Criteria	B (see *COMPLIANCE CRITERIA FOR IMMUNITY TESTS)*

Test Results (with reference to EN 55024) – 50Hz

Tested Port	Reduction to %	Ts (Periods)	Frequency	Acceptance criteria	Result Classification
AC mains	>95%	0,5	50Hz	B	A
AC mains	30%	25	50Hz	C	B
AC mains	>95%	250	50Hz	C	B

Test Results (with reference to EN 55024) – 60Hz

Tested Port	Reduction to %	Ts (Periods)	Frequency	Acceptance criteria	Result Classification
AC mains	>95%	0,5	50Hz	B	A
AC mains	30%	25	50Hz	C	B
AC mains	>95%	250	50Hz	C	B

Test Results (with reference to EN 61000-4-11) – 50Hz

Tested Port	Reduction to %	Ts (Cycle)	Frequency	Acceptance criteria	Result Classification
AC mains	0%	1/2	50Hz	A	A
AC mains	0%	1	50Hz	C	A
AC mains	70%	25	50Hz	C	B
AC mains	0%	250	50Hz	C	B

Test Results (with reference to EN 61000-4-11) – 60Hz

Tested Port	Reduction to %	Ts (Cycle)	Frequency	Acceptance criteria	Result Classification
AC mains	0%	1/2	60Hz	A	A
AC mains	0%	1	60Hz	C	A
AC mains	70%	30	60Hz	C	B
AC mains	0%	300	60Hz	C	B

Test Results (with reference to EN 61000-4-11) – 50Hz

Tested Port	Reduction to %	Ts (Cycle)	Ti (cycle)	Frequency	Acceptance criteria	Result Classification
AC mains	70%	1	25	50Hz	C	B

Test Results (with reference to EN 61000-4-11) – 60Hz

Tested Port	Reduction to %	Ts (Cycle)	Ti (cycle)	Frequency	Acceptance criteria	Result Classification
AC mains	70%	1	30	60Hz	C	B

Test N.11	**MAGNETIC FIELD -** *CAMPO MAGNETICO*

Reference Standard	EN 61000-4-8
List of reference equipment	➢ Functions Generator Sigilent mod. SDG1010 (Inv. 87020516) ➢ DC Power Supply Sorensen mod. DCS33-33E (Inv. 87020517) ➢ Load & Switchbox SPIN-MAGIMM (Inv. 87020518) ➢ Loop MAGIMM Spin Electronic (Inv. 87020481) ➢ Amplifier Behringen mod. EPQ1200 (Inv. 87020515)
Measurement Uncertainty	Expanded uncertainty: 15,8% of set value Coverage probability: 95% Coverage factor: 2,0
Number of samples under test	1

Test Conditions	Required	Measured
Ambient Temperature	(15 ÷ 35) °C	(21 ± 2) °C
Ambient Relative Humidity	(25 ÷ 75) %Rh	(50 ± 10) %rH

Test Setup	EN 61000-4-8 Par. 7
Test Procedure	EN 61000-4-8 Par. 8
EUT Operating Mode(s)	#1
Acceptance Criteria	A (see *COMPLIANCE CRITERIA FOR IMMUNITY TESTS)*

Test Results (with reference to EN 50121-4) – 50Hz

Tested Port	Magnetic Field Characteristics			Acceptance criteria	Result Classification
	Level	Frequency	Testing time		
Enclosure	100 A/m	16,7 Hz	10 sec	A	A
Enclosure	300A/m	0 Hz	10 sec	A	A

Test Results (with reference to EN 50121-4) – 60Hz

Tested Port	Magnetic Field Characteristics			Acceptance criteria	Result Classification
	Level	Frequency	Testing time		
Enclosure	100 A/m	16,7 Hz	10 sec	A	A
Enclosure	300A/m	0 Hz	10 sec	A	A

Test Results (with reference to EN 55024) – 50Hz

Tested Port	Magnetic Field Characteristics			Acceptance criteria	Result Classification
	Level	Frequency	Testing time		
Enclosure	1 A/m	50 Hz	10 sec	A	A
Enclosure	1 A/m	60 Hz	10 sec	A	A

Test Results (with reference to EN 55024) – 60Hz

Tested Port	Magnetic Field Characteristics			Acceptance criteria	Result Classification
	Level	Frequency	Testing time		
Enclosure	1 A/m	50 Hz	10 sec	A	A
Enclosure	1 A/m	60 Hz	10 sec	A	A

END OF TEST REPORT